3.11 AIR QUALITY

This section describes air quality conditions in the area surrounding Buena Vista Lagoon and the areas identified for materials disposal/reuse. This section also identifies pertinent policies and regulations governing air quality and evaluates the impacts associated with implementation of the Enhancement Project and its alternatives.

3.11.1 EXISTING CONDITIONS

The relevant policies and regulations dictating air quality at the project site and materials disposal sites are discussed within this section. A comprehensive description of applicable regulatory laws, plans, policies, and regulations is provided in Appendix B. Additional regulatory requirements pertaining to other specific topic areas, such as noise, air quality, water quality, etc., are discussed in their respective analysis sections. Model outputs from the air quality emissions modeling are included in Appendix I.

Regulatory Setting

A full description of the regulatory setting for this document can be found in Appendix B. The following laws, regulations, policies, and plans are applicable to this resource area:

- Clean Air Act
- Clean Air Act, Toxic Air Contaminants
- Executive Order 12088
- California Clean Air Act
- State Implementation Plan

Climate, Topography, and Meteorology

Climate, topography, and meteorology influence regional and local ambient air quality. Southern California is characterized as a semiarid climate, although it contains three distinct zones of rainfall that coincide with the coast, mountain, and desert. Buena Vista Lagoon is located in the Cities of Carlsbad and Oceanside in the central coastal portion of San Diego County, and within the San Diego Air Basin (SDAB). The SDAB is a coastal plain with connecting broad valleys and low hills, bounded by the Pacific Ocean to the west and high mountain ranges to the east. The topography in the SDAB region varies greatly, from beaches on the west, to mountains and then desert to the east. The mountains to the east inhibit the dispersion of pollutants (generated in the SDAB) to the east.

The climate of the SDAB is characterized by warm, dry summers and mild winters. One of the main determinants of its climatology is a semipermanent high-pressure area (the Pacific High) in the eastern Pacific Ocean. This high-pressure cell maintains clear skies for much of the year. When the Pacific High moves southward during the winter, this pattern changes, and low-pressure storms are brought into the region, causing widespread precipitation. During fall, the region often experiences dry, warm easterly winds, locally referred to as Santa Ana winds, which raise temperatures and lower humidity, often to less than 20 percent. Rainfall in the City of Oceanside, which is the nearest climate monitoring station to the project site, averages approximately 10.54 inches annually (WRCC 2014). The heaviest precipitation occurs November through April. The mean annual air temperature is 60.3 degrees Fahrenheit (°F), and the mean maximum and mean minimum temperatures are 67.6°F and 52.9°F, respectively (WRCC 2014).

A dominant characteristic of spring and summer is night and early morning cloudiness, locally known as the marine layer. Low clouds form regularly, frequently extending inland over the coastal foothills and valleys. These clouds usually dissipate during the morning, and afternoons are generally clear.

A common atmospheric condition known as a temperature inversion affects air quality in the SDAB. During an inversion, air temperatures get warmer rather than cooler with increasing height. Inversion layers are important for local air quality, because they inhibit the dispersion of pollutants and result in a temporary degradation of air quality. The pollution potential of an area is largely dependent on a combination of winds, atmospheric stability, solar radiation, and terrain. The combination of low wind speeds and low-level inversions produces the greatest concentration of air pollutants. On days without inversions, or on days of winds averaging over 15 miles per hour (mph), the atmospheric pollution potential is greatly reduced.

Criteria Air Pollutants

EPA and the California Air Resources Board (ARB) focus on the following air pollutants as indicators of ambient air quality: ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter with a diameter of 10 micrometers or less (PM_{10}), fine particulate matter with a diameter of 2.5 micrometers or less ($PM_{2.5}$), and lead. Because these are the most prevalent air pollutants known to be harmful to human health and EPA regulates them by developing criteria for allowable emission levels, they are commonly referred to as "criteria air pollutants." Health-based air quality standards have been established for these pollutants by ARB at the state level and by EPA at the national level. These standards were established to protect the public with a margin of safety from adverse health impacts due to exposure to air pollution. California has also established standards for sulfates, visibility-reducing particles, hydrogen sulfide, and vinyl chloride. A brief description of each criteria air pollutant, including source types and impacts to health, is provided below along with the most current monitoring station data and attainment designations for the project study areas. Table 3.11-1 presents the California Ambient Air Quality Standards (CAAQS) and the National Ambient Air Quality Standards (NAAQS).

Ozone

Ozone is a colorless, odorless gas that primarily exists in the upper atmosphere (stratosphere) as the ozone layer and in the lower atmosphere (troposphere) as a pollutant. Tropospheric ozone is a principal cause of lung and eye irritation in the urban environment and is the principal component of smog, which is formed in the troposphere through a series of reactions involving volatile organic compounds (VOC) and nitrogen oxides (NO_X) in the presence of sunlight. Therefore, VOC and NO_X are precursors of ozone. VOC and NO_X emissions are both considered critical in ozone formation. Control strategies for ozone have focused on reducing these emissions from vehicles, industrial processes using solvents and coatings, and consumer products. Ozone concentrations are generally highest in the summer, when atmospheric inversions are greatest, and sunlight is abundant and temperatures are high.

Particulate Matter (PM)

PM is a complex mixture of extremely small particles and liquid droplets. PM consists of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles. Natural sources of PM include windblown dust and ocean spray. Some particles are emitted directly into the atmosphere. Others, referred to as secondary particles, result from gases that are transformed into particles through physical and chemical processes in the atmosphere.

The size of PM is directly linked to the potential for causing health problems. EPA is concerned about particles that are 10 micrometers in diameter or smaller because those are the particles that generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects such as aggravation of respiratory and cardiovascular disease, lung disease, decreased lung function, asthma attacks, and certain cardiovascular problems such as heart attacks and irregular heartbeat. Individuals particularly sensitive to fine particle exposure include older adults, people with heart and lung disease, and children. EPA groups PM into two categories, coarse PM or PM_{10}, and fine PM or $PM_{2.5}$, as described below.

Table 3.11-1
National and California Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [a]		National Standards [b]		
		Concentra-tion [c]	Method	Primary [c,d]	Secondary [c,e]	Method
Ozone	1 hour	0.09 ppm (180 µg/m^3)	Ultraviolet photometry	–	Same as primary standard	Ultraviolet photometry
	8 hours	0.070 ppm (137 µg/m^3)		0.075 ppm (147 µg/m^3)		
Respirable particulate matter (PM_{10})	24 hours	50 µg/m^3	Gravimetric or beta attenuation	150 µg/m^3	Same as primary standard	Inertial separation and gravimetric analysis
	Annual arithmetic mean	20 µg/m^3		–		
Fine particulate matter ($PM_{2.5}$)	24 hours	–	–	35 µg/m^3	Same as primary standard	Inertial separation and gravimetric analysis
	Annual arithmetic mean	12 µg/m^3	Gravimetric or beta attenuation	12 µg/m^3	15 µg/m^3	
Carbon monoxide	1 hour	20 ppm (23 mg/m^3)	Nondispersive infrared photometry (NDIR)	35 ppm (40 mg/m^3)	–	Nondispersive infrared photometry (NDIR)
	8 hours	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	–	
	8 hours (Lake Tahoe)	6 ppm (7 mg/m^3)		–	–	
Nitrogen dioxide [f]	1 hour	0.18 ppm (339 µg/m^3)	Gas phase chemiluminescence	100 ppb (188 µg/m^3)	–	Gas phase Chemiluminescence
	Annual arithmetic mean	0.030 ppm (57 µg/m^3)		0.053 ppm (100 µg/m^3)	Same as primary standard	
Sulfur dioxide [g]	1 hour	0.25 ppm (655 µg/m^3)	Ultraviolet fluorescence	75 ppb (196 µg/m^3)	–	Spectrophotometry (paraosaniline method)
	3 hours	–		–	0.5 ppm (1,300 µg/m^3)	
	24 hours	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas) [g]	–	
	Annual arithmetic mean	–		0.030 ppm (for certain areas) [g]	–	
Lead [h,i]	30-day average	1.5 µg/m^3	Atomic absorption	–	–	High-volume sampler and atomic absorption
	Calendar quarter	–		1.5 µg/m^3 (for certain areas) [i]	Same as primary standard	
	Rolling 3-month average	–		0.15 µg/m^3		
Visibility-reducing particles [j]	8 hours	See footnote j	Beta attenuation and transmittance through filter tape	No national standards		
Sulfates	24 hours	25 µg/m^3	Ion chromatography			
Hydrogen sulfide	1 hour	0.03 ppm (42 µg/m^3)	Ultraviolet fluorescence			
Vinyl chloride [j]	24 hours	0.01 ppm (26 µg/m^3)	Gas chromatography			

Notes: mg/m^3 = milligrams per cubic meter; $PM_{2.5}$ = fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less; PM_{10} = respirable particulate matter with an aerodynamic resistance diameter of 10 micrometers or less; ppb = parts per billion; ppm = parts per million; µg/m^3 = micrograms per cubic meter

[a] California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1- and 24-hour), nitrogen dioxide, and particulate matter (PM_{10}, $PM_{2.5}$, and visibility-reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[b] National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than 1. For $PM_{2.5}$, the 24-hour standard is attained when 98% of the daily concentrations, averaged over 3 years, are equal to or less than the standards. Contact the U.S. Environmental Protection Agency for further clarification and current national policies.

[c] Concentration expressed first in the units in which it was promulgated. Equivalent units given in parentheses are based on a reference temperature of 25 degrees Celsius (°C) and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and reference pressure of 760 torr; parts per million (ppm) in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[d] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

[e] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[f] To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of ppb. California standards are in units of ppm. To directly compare the national 1-hour standard to the California standards, the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

[g] On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until 1 year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.
Note that the 1-hour national standard is in units of ppb. California standards are in units of ppm. To directly compare the 1-hour national standard to the California standard, the units can be converted to ppm. In this case, the national standard of 75 ppb is identical of 0.075 ppm.

[h] The California Air Resources Board (ARB) has identified lead and vinyl chloride as toxic air contaminants, with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[i] The national standard for lead was revised on October 15, 2008, to a rolling 3-month average. The 1978 lead standard (1.5 µg/m^3 as a quarterly average) remains in effect until 1 year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standards are approved.

[j] In 1989, ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are “extinction of 0.23 per kilometer” and the “extinction of 0.07 per kilometer” for the statewide and Lake Tahoe Air Basin standards, respectively.

Source: ARB 2013

PM_{10}, such as found near roadways and dusty industries, is 10 micrometers or smaller in diameter. Sources of PM_{10} include crushing or grinding operations and dust from paved or unpaved roads. Control of PM_{10} is primarily achieved through the control of dust at construction and industrial sites, the cleaning of paved roads, and the wetting or paving of frequently used unpaved roads.

$PM_{2.5}$, such as found in smoke and haze, is 2.5 micrometers or smaller in diameter. $PM_{2.5}$ poses an increased health risk because these particles can deposit deep in the lungs and contain substances that are particularly harmful to human health. Sources of $PM_{2.5}$ include all types of combustion activities such as motor vehicles, power plants, wood burning, and certain industrial processes. $PM_{2.5}$ is the major cause of reduced visibility (haze) in California.

Carbon Monoxide (CO)

CO is a colorless and odorless gas that, in the urban environment, is associated primarily with the incomplete combustion of fossil fuels in motor vehicles. In addition to regional CO emissions, localized CO emissions can be of concern. Relatively high concentrations are typically found near crowded intersections and along heavily used roadways carrying slow-moving traffic. Even under the most severe meteorological and traffic conditions, high concentrations of CO are limited to locations within a relatively short distance (300 to 600 feet) of heavily traveled roadways and intersections. Overall, CO emissions are decreasing because of the Federal Motor Vehicle Control Program, which has mandated increasingly lower emission levels for vehicles manufactured since 1973. CO concentrations are typically higher in the winter; therefore, California has required the use of oxygenated gasoline in the winter months to reduce CO emissions.

Nitrogen Dioxide (NO_2)

NO_2 is a gas that is a product of the combustion of fossil fuels generated from vehicles and stationary sources, such as power plants and boilers. NO_2 can cause lung damage. As noted above, NO_2 is a type of NO_X and is a principal contributor to ozone and smog production.

Sulfur Dioxide (SO_2)

SO_2 is a gas that is a product of the combustion of fossil fuels, with the primary source being power plants and heavy industry that utilize coal or oil as fuel. SO_2 is also a product of diesel engine emissions. The human health effects of SO_2 include lung disease and breathing problems for asthmatics. SO_2 in the atmosphere contributes to the formation of acid rain.

Lead

Lead is a highly toxic metal that may cause a range of human health effects. Lead anti-knock additives in gasoline represent a major source of lead emissions to the atmosphere. However, lead emissions have significantly decreased due to the near elimination of leaded gasoline use. Lead-based paint, banned or limited by EPA in the 1980s, is a health hazard when it deteriorates by peeling, chipping, or cracking, or it generates lead dust when scraped, sanded, or heated.

Toxic Air Contaminants

In addition to criteria pollutants, both federal and state air quality regulations also focus on toxic air contaminants (TACs). TACs can be separated into carcinogens and noncarcinogens based on the nature of the effects associated with exposure to the pollutant. For regulatory purposes, carcinogens are assumed to have no safe threshold below which health impacts would not occur. Any exposure to a carcinogen poses some risk of contracting cancer. Noncarcinogens differ in that there is generally assumed to be a safe level of exposure below which no negative health impact is believed to occur. These levels are determined on a pollutant-by-pollutant basis.

TACs may be emitted by stationary, area, or mobile sources. Common stationary sources of TAC emissions include gasoline stations, dry cleaners, and diesel backup generators, which are subject to local air district permit requirements. The other, often more significant, sources of TAC emissions are motor vehicles on freeways, high-volume roadways, or other areas with high numbers of diesel vehicles, such as distribution centers. Off-road mobile sources are also major contributors of TAC emissions and include construction equipment, ships, and trains.

Particulate exhaust emissions from diesel-fueled engines (diesel PM) were identified as a TAC by ARB in 1998. Federal and state efforts to reduce diesel PM emissions have focused on the use of improved fuels, adding particulate filters to engines, and requiring the production of new-technology engines that emit fewer exhaust particulates.

Odor

Odors are considered an air quality issue both at the local level (e.g., odor from wastewater treatment) and at the regional level (e.g., smoke from wildfires). Odors are generally regarded as an annoyance rather than a health hazard. However, manifestations of a person’s reaction to foul odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache).

The ability to detect odors varies considerably among the population and is subjective. Some individuals have the ability to smell minute quantities of specific substances while others may not have the same sensitivity but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor; an odor that is offensive to one person (e.g., from a fast-food restaurant or bakery) may be perfectly acceptable to another. Unfamiliar odors may be more easily detected and likely to cause complaints than familiar ones.

Several examples of common land use types that generate substantial odors include wastewater treatment plants, landfills, composting/green waste facilities, recycling facilities, petroleum refineries, chemical manufacturing plants, painting/coating operations, rendering plants, and food packaging plants.

Odors associated with natural conditions can be present in lagoon soils, particularly those in coastal areas (EPA 2014). Wetland soils develop under low oxygen or anaerobic conditions, and this lack of oxygen prevents plants and soil microorganisms from carrying out normal aerobic respiration. Many bacteria living in wetland soils respire anaerobically, and acquire the minimal amounts of oxygen they need by removing it from other compounds, such as sulfur (EPA 2014). This can lead to the production of hydrogen sulfide, creating the rotten egg smell characteristic of some wetland soils, as well as the release of nitrogen gas into the atmosphere (EPA 2014).

Influences from adjacent urbanization have affected water quality, including runoff from adjacent roadways and development, as well as releases of sewage into the lagoon. Almost all of the coastal lagoons in San Diego County, including Buena Vista Lagoon, have a history of use as sewage disposals and releases. The effluent adds a large nutrient load, particularly nitrogen and phosphorus, to the naturally nutrient-rich lagoon water. This results in a stimulation of excessive plant growth, accumulation of sludge from the partially decomposed organic matter, and the development of foul odors.

Health Effects of Criteria Air Pollutants

Ozone

Individuals exercising outdoors, children, and people with preexisting lung disease, such as asthma and chronic pulmonary lung disease, are considered the most susceptible subgroups for ozone effects. Short-term exposure (lasting for a few hours) to ozone can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes. In recent years, a correlation between elevated ambient ozone levels and increases in daily hospital admission rates, as well as mortality, has also been reported. An increased risk for asthma has been found in children who participate in multiple sports and live in communities with high ozone levels.

Ozone exposure under exercising conditions is known to increase the severity of the responses described above. Animal studies suggest that exposure to a combination of pollutants that includes ozone may be more toxic than exposure to ozone alone. Although lung volume and resistance changes observed after a single exposure diminish with repeated exposures, biochemical and cellular changes appear to persist, which can lead to subsequent lung structural changes.

Particulate Matter (PM)

A consistent correlation between elevated ambient fine PM_{10} and $PM_{2.5}$ levels and an increase in mortality rates, respiratory infections, number and severity of asthma attacks, and number of hospital admissions has been observed in different parts of the United States and various areas around the world. In recent years, some studies have reported an association between long-term exposure to air pollution dominated by fine particles and increased mortality, reduction in life-span, and an increased mortality from lung cancer.

Daily fluctuations in $PM_{2.5}$ concentration levels have also been related to hospital admissions for acute respiratory conditions in children, to school and kindergarten absences, to a decrease in respiratory lung volumes in normal children, and to increased medication use in children and adults with asthma. Recent studies show lung function growth in children is reduced with long-term exposure to PM. The elderly, people with preexisting respiratory or cardiovascular disease, and children appear to be more susceptible to the effects of high levels of PM_{10} and $PM_{2.5}$.

Carbon Monoxide (CO)

Individuals with a deficient blood supply to the heart are the most susceptible to the adverse effects of CO exposure. The effects observed include earlier onset of chest pain with exercise, and electrocardiograph changes indicative of decreased oxygen supply to the heart. Inhaled CO has no direct toxic effect on the lungs, but exerts its effect on tissues by interfering with oxygen transport. Hence, conditions with an increased demand for oxygen supply can be adversely affected by exposure to CO. Individuals most at risk include fetuses, patients with diseases involving heart and blood vessels, and patients with chronic hypoxemia (oxygen deficiency) as seen at high altitudes.

Reduction in birth weight and impaired neurobehavioral development have been observed in animals chronically exposed to CO. Recent studies have found increased risks for adverse birth outcomes with exposure to elevated CO levels; these include pre-term births and heart abnormalities.

Nitrogen Dioxide (NO_2)

Population-based studies suggest that an increase in acute respiratory illness, including infections and respiratory symptoms in children (not infants), is associated with long-term exposure to NO_2 at levels found in homes with gas stoves, which are higher than ambient levels found in southern California. Increase in resistance to air flow and airway contraction is observed after short-term exposure to NO_2 in healthy subjects. Larger decreases in lung functions are observed in individuals with asthma or chronic obstructive pulmonary disease (e.g., chronic bronchitis, emphysema) than in healthy individuals, indicating a greater susceptibility of these subgroups.

In animals, exposure to levels of NO_2 considerably higher than ambient concentrations results in increased susceptibility to infections, possibly due to the observed changes in cells involved in maintaining immune functions. The severity of lung tissue damage associated with high levels of ozone exposure increases when animals are exposed to a combination of ozone and NO_2.

Sulfur Dioxide (SO_2)

A few minutes of exposure to low levels of SO_2 can result in airway constriction in some asthmatics, all of whom are sensitive to its effects. In asthmatics, an increase in resistance to air flow, as well as reduction in breathing capacity leading to severe breathing difficulties, is observed after acute exposure to SO_2. In contrast, healthy individuals do not exhibit similar acute responses even after exposure to higher concentrations of SO_2.

Animal studies suggest that despite SO_2 being a respiratory irritant, it does not cause substantial lung injury at ambient concentrations. However, very high levels of exposure can cause lung edema (fluid accumulation), lung tissue damage, and sloughing off of cells lining the respiratory tract. Some population-based studies indicate that the mortality and morbidity effects associated with fine particles show a similar association with ambient SO_2 levels. In these studies, efforts to separate the effects of SO_2 from those of fine particles have not been successful. It is not clear whether the two pollutants act synergistically or one pollutant alone is the predominant factor.

Lead

Fetuses, infants, and children are more sensitive than others to the adverse effects of lead exposure. Exposure to low levels of lead can adversely affect the development and function of the central nervous system, leading to learning disorders, distractibility, inability to follow simple commands, and lower intelligence quotient. In adults, increased lead levels are associated with increased blood pressure. Lead poisoning can cause anemia, lethargy, seizures, and death, although it appears that there are no direct effects of lead on the respiratory system. Lead can be stored in the bone from early age environmental exposure, and elevated blood lead levels can occur due to breakdown of bone tissue during pregnancy, hyperthyroidism (increased secretion of hormones from the thyroid gland), and osteoporosis (breakdown of bony tissue). Fetuses and breast-fed babies can be exposed to higher levels of lead because of previous environmental lead exposure of their mothers.

Toxic Air Contaminants

Diesel engines tend to produce a much higher ratio of fine particulates than other types of internal combustion engines. The fine particles that make up diesel PM tend to penetrate deep into the lungs and the rough surfaces of these particles makes it easy for them to bind with other toxins within the exhaust, thus increasing the hazards of particle inhalation. Long-term exposure to diesel PM is known to lead to chronic, serious health problems including cardiovascular disease, cardiopulmonary disease, and lung cancer.

Odors

Offensive odors can potentially affect human health in several ways. First, odorant compounds can irritate the eye, nose, and throat, which can reduce respiratory volume. Second, the VOCs that cause odors can stimulate sensory nerves to cause neurochemical changes that might influence health, for instance, by compromising the immune system. Finally, unpleasant odors can trigger memories or attitudes linked to unpleasant odors, causing cognitive and emotional effects such as stress.

SDAB Attainment Status

Both EPA and ARB use ambient air quality monitoring data to designate areas according to their attainment status for criteria air pollutants. The purpose of these designations is to identify the areas with air quality problems and initiate planning efforts for improvement. The three basic designation categories are nonattainment, attainment, and unclassified. An “attainment” designation for an area signifies that pollutant concentrations did not exceed the established standard. In most cases, areas designated or redesignated as attainment must develop and implement maintenance plans, which are designed to ensure continued compliance with the standard.

In contrast to attainment, a “nonattainment” designation indicates that a pollutant concentration has exceeded the established standard. Nonattainment may differ in severity. To identify the severity of the problem and the extent of planning and actions required to meet the standard, nonattainment areas are assigned a classification that is commensurate with the severity of their air quality problem (e.g., moderate, serious, severe, extreme).

Finally, an unclassified designation indicates that insufficient data exist to determine attainment or nonattainment. In addition, the California designations include a subcategory of nonattainment-transitional, which is given to nonattainment areas that are progressing and nearing attainment.

As shown in Table 3.11-2, the SDAB currently meets NAAQS for all criteria air pollutants except ozone, and meets the CAAQS for all criteria air pollutants except ozone, PM_{10}, and $PM_{2.5}$. The SDAB currently falls under a federal maintenance plan for 8-hour ozone. The SDAB is currently classified as a state nonattainment area for ozone, PM_{10}, and $PM_{2.5}$.

Table 3.11-2
San Diego Air Basin Attainment Designations

Pollutant	State	Federal
Ozone (1-hour)	Nonattainment	Attainment
Ozone (8-hour)	Nonattainment	Nonattainment
Carbon Monoxide	Attainment	Unclassified/Attainment
Nitrogen Dioxide	Unclassified/Attainment	Unclassified/Attainment
Sulfur Dioxide	Unclassified/Attainment	Unclassified/Attainment
PM_{10}	Nonattainment	Unclassified
$PM_{2.5}$	Nonattainment	Unclassified
Sulfates	Attainment	N/A
Hydrogen Sulfide	Unclassified	N/A
Visibility Reducing Particles	Unclassified/Attainment	N/A
Lead	Unclassified/Attainment	Unclassified/Attainment

Source: ARB 2014a
N/A = not applicable; no standard.

SDAB Existing Air Quality

Ambient air pollutant concentrations in the SDAB are measured at air quality monitoring stations operated by ARB and the San Diego Air Pollution Control District (SDAPCD). The closest and most representative SDAPCD air quality monitoring station to the project site is the Camp Pendleton monitoring station. However, that monitoring station only collects data on concentrations of ozone and NO_2. The closest monitoring station with complete data is the Escondido monitoring station, located at 600 East Valley Parkway in Escondido, California. Table 3.11-3 presents the most recent available data over the past 3 years from the Camp Pendleton and Escondido monitoring stations as summaries of the exceedances of standards and the highest pollutant levels recorded for years 2011 through 2013.

As shown in Table 3.11-3, ambient air concentrations of CO and NO_2 at the Camp Pendleton and Escondido monitoring stations have not exceeded the NAAQS/CAAQS in the past 3 years. PM_{10} concentrations exceeded the CAAQS and $PM_{2.5}$ concentrations exceeded the federal standards in 2013. Concentrations of 8-hour ozone registered at the monitoring station also exceeded the NAAQS in 2012 and the CAAQS in 2011 and 2012.

Table 3.11-3
Ambient Air Quality Summary – Camp Pendleton and Escondido Monitoring Stations

Pollutant Standards	2011	2012	2013
Carbon Monoxide (CO)			
National maximum 8-hour concentration (ppm)	2.20	3.61	*
State maximum 8-hour concentration (ppm)	2.30	3.70	*
Number of Days Standard Exceeded			
NAAQS 8-hour (>9.0 ppm)	0	0	0
CAAQS 8-hour (>9.0 ppm)	0	0	0
Nitrogen Dioxide (NO_2)			
State maximum 1-hour concentration (ppm)	0.064	0.061	0.081
Annual Average (ppm)	*	0.008	*
Number of Days Standard Exceeded			
CAAQS 1-hour	0	0	0
Ozone			
State maximum 1-hour concentration (ppm)	0.085	0.092	0.078
National maximum 8-hour concentration (ppm)	0.071	0.081	0.066
Number of Days Standard Exceeded			
CAAQS 1-hour (>0.09 ppm)	0	0	0
CAAQS 8- hour (>0.070 ppm)/NAAQS 8-hour (>0.075 ppm)	2/0	1/1	0/0
Particulate Matter (PM_{10}) [a]			
National maximum 24-hour concentration (μg/m^3)	40.0	33.0	80.0
State maximum 24-hour concentration (μg/m^3)	40.0	33.0	82.0
State annual average concentration (μg/m^3)	18.8	18.1	23.1
Estimated Number of Days Standard Exceeded			
NAAQS 24-hour (>150 μg/m^3)	0	0	0
CAAQS 24-hour (>50 μg/m^3)	0	0	1
Particulate Matter ($PM_{2.5}$) [a]			
National maximum 24-hour concentration (μg/m^3)	27.4	70.7	56.3
State maximum 24-hour concentration (μg/m^3)	27.4	70.7	56.3
National annual average concentration (μg/m^3)	10.4	10.5	10.5
State annual average concentration (μg/m^3)	10.4	*	10.5
Estimated Number of Days Standard Exceeded			
NAAQS 24-hour (>35 μg/m^3)	0	1	1

μg/m^3 = micrograms per cubic meter; ppm == parts per million
Source: ARB 2014b

Sensitive Receptors

Some members of the population are especially sensitive to air pollutant emissions and should be given special consideration when evaluating air quality impacts from projects. These include children, the elderly, people with preexisting respiratory or cardiovascular illness, and athletes and others who engage in frequent exercise. Air quality regulators typically define sensitive receptors as schools, hospitals, resident care facilities, day-care centers, or other facilities that may house individuals with health conditions that would be adversely impacted by changes in air quality.

Residential areas are also considered sensitive to air pollution because residents (including children and the elderly) tend to be at home for extended periods of time, resulting in sustained exposure to pollutants present. Recreational land uses are considered moderately sensitive to air pollution. Exercise places a high demand on respiratory functions, which can be impaired by air pollution even though exposure periods during exercise are generally short. In addition, noticeable air pollution can detract from the enjoyment of recreation. Industrial and commercial areas are considered the least sensitive to air pollution. Exposure periods are relatively short and intermittent as the majority of the workers tend to stay indoors most of the time.

3.11.2 Significance Criteria

A significant impact to air quality would occur if implementation of the Enhancement Project would result in any of the following:

A. Conflict with or obstruction to implementation of the applicable air quality plan;

B. Violation of air quality standards or substantial contribution to an existing or projected air quality violation;

C. Cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors);

D. Exposure of sensitive receptors to substantial pollutant concentrations; or

E. Creation of objectionable odors affecting a substantial number of people.

As stated in Appendix G of the CEQA Guidelines, the significance criteria established by the applicable air quality management board or air pollution control district may be relied on to make the impact determinations for specific program elements. SDAPCD has not developed quantitative significance thresholds for CEQA projects.

Since SDAPCD does not have quantitative significance thresholds, the San Diego County screening thresholds of significance for regional pollutant emissions were used to analyze the impacts of the project. A project with emissions rates below these thresholds is considered to have a less than significant impact on regional and local air quality throughout the SDAB. The County of San Diego *Guidelines for Determining Significance and Report Format and Content Requirements, Air Quality* (2007), which outline these screening level thresholds, state that a project that results in an emissions increase less than these levels would not lead to a violation of a NAAQS or CAAQS. The screening level thresholds are shown in Table 3.11-4.

Table 3.11-4
Regional Pollutant Emission Screening Level Thresholds of Significance

	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$	Lead
Pounds per hour	–	25	100	25	–	–	–
Pounds per day	75	250	550	250	100	55	3.2
Tons per year	13.7	40	100	40	15	10	0.6

ROG = reactive organic gases; NO_X = oxides of nitrogen; SO_X = sulfur oxides; CO = carbon monoxide; PM_{10} = respirable particulate matter with an aerodynamic resistance diameter of 10 micrometers or less, $PM_{2.5}$ = fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less

– = No threshold proposed

Source: County of San Diego 2007

This analysis does not directly evaluate lead or oxides of sulfur (SO_X) because little to no quantifiable and foreseeable emissions of these substances would be generated by the project. Lead emissions have significantly decreased due to the near elimination of leaded fuel use. On- and off-road diesel fuel used in California must meet low sulfur standards established by ARB.

3.11.3 Impact Analysis

This analysis focuses on the criteria pollutant emissions resulting from construction and subsequent maintenance activities of the Enhancement Project. This analysis evaluates the impacts of lagoon enhancement and materials disposal together. The finding of significance for the CEQA thresholds cannot be determined separately and must be based on emissions for the entire project.

Lagoon Enhancement and Material Disposal/Reuse

Freshwater Alternative

Temporary Impacts

Project consistency is based on whether the Enhancement Project would conflict with or obstruct implementation of the Regional Air Quality Strategy (RAQS) and/or applicable portions of the State Implementation Plan (SIP). Projects that are consistent with the assumptions used in development of the applicable air quality plan would not conflict with or obstruct the attainment of the air quality levels identified in the plan, even if the project-level emissions exceed the regional emissions thresholds.

Consistency with the RAQS is determined by analyzing a project with the assumptions in the RAQS. Emission forecasts rely on projections of vehicle miles traveled (VMT) by the Metropolitan Planning Organizations, such as SANDAG, and population, employment, and land use projections made by local jurisdictions. The project would primarily involve dredging and off-road equipment operations. On-road trip generation would also occur during construction of the Enhancement Project. Since the trip generation associated with construction would be temporary, the Enhancement Project would not increase activities and/or emissions associated with on-road mobile sources that have been included in the RAQS. **The Freshwater Alternative would not obstruct or conflict with the implementation of the SDAPCD RAQS, and this impact would be less than significant (Criterion A).**

Construction of the Freshwater Alternative would include vegetation removal, dredging and grading within the lagoon, disposal of sediments excavated from the lagoon, infrastructure improvements (e.g., Boardwalk construction), and revegetation of graded areas. During construction, criteria air pollutant and precursor emissions would be temporarily and intermittently generated from a variety of sources. Construction would include off-road equipment, such as backhoes and front-end loaders, boats, hydraulic dredge equipment, and heavy-duty trucks. In addition, booster pumps may be necessary to convey material to the disposal locations. Since the majority of the construction activities would occur within lagoon, the soil would be saturated, minimizing fugitive dust emissions. Based on the dredging and materials disposal approach and schedule, it is not anticipated that the project would result in stockpiling of soil and related fugitive dust emissions.

The analysis would be conducted beginning in the year 2017, which is the earliest year that construction could occur. Although construction activities could commence in a later year, this provides a conservative analysis because, as construction occurs in future years, emission factors associated with off-road construction equipment would be lower as a result of fleet turnover and improved emissions technologies. It is estimated that the entire construction program would take 15 to 30 months to complete.

Construction emissions were modeled based on a worst-case scenario and assumes that construction of the infrastructure improvements (e.g., Boardwalk) would overlap with other construction phases (e.g., sediment removal) for a few months during the construction period.

Consistent with the project description, criteria pollutant emissions were estimated for scenarios that involve disposal of sediments at LA-5 and a scenario that involves an overdredge pit. As shown in Table 3.11-5, construction emissions for disposal at LA-5 would result in maximum daily emissions of approximately 66 pounds of reactive organic gases (ROG), 567 pounds of NO_X, 283 pounds of CO, 38 pounds of PM_{10}, and 28 pounds of $PM_{2.5}$. Additional modeling assumptions and details are provided in Appendix I. Construction emissions for the overdredge pit would result in maximum daily emissions of approximately 48 pounds of ROG, 425 pounds of NO_X, 205 pounds of CO, 33 pounds of PM_{10}, and 23 pounds of $PM_{2.5}$. Additional modeling assumptions and details are provided in Appendix I.

Table 3.11-5
Estimated Daily Construction Emissions – Freshwater Alternative

Emission Source	Criteria Pollutant Emissions (pounds/day)				
	ROG	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**
LA-5					
Mobilization	0.72	8.07	3.69	0.33	0.26
Site Preparation	3.95	28.50	15.72	1.04	0.93
Vegetation Clearing	9.53	156.77	44.11	5.08	3.73
Sediment Removal	64.43	553.39	276.08	37.05	27.42
Construct Inlet Weir	5.78	43.65	25.53	2.00	1.81
Infrastructure Improvements	1.65	13.57	6.45	0.47	0.39
Worker Commutes	0.03	0.31	0.72	0.05	0.03
Maximum Daily Emissions	**66.12**	**567.26**	**283.25**	**37.57**	**27.84**
Daily Thresholds	**75**	**250**	**550**	**100**	**55**
Exceed Thresholds?	**No**	**Yes**	**No**	**No**	**No**
Overdredge Pit					
Mobilization	0.72	8.07	3.69	0.33	0.26
Site Preparation	3.95	28.50	15.72	1.04	0.93
Vegetation Clearing	9.53	156.77	44.11	5.08	3.73
Sediment Removal	46.83	410.83	198.18	32.22	22.98
Construct Inlet Weir	5.78	43.65	25.53	2.00	1.81
Infrastructure Improvements	1.65	13.57	6.45	0.47	0.39
Worker Commutes	0.01	0.13	0.30	0.02	0.01
Maximum Daily Emissions	**48.49**	**424.53**	**204.93**	**32.71**	**23.38**
Daily Thresholds	**75**	**250**	**550**	**100**	**55**
Exceed Thresholds?	**No**	**Yes**	**No**	**No**	**No**

Source: Modeled by AECOM 2014; for more detail see Appendix I

As shown in Table 3.11-5, construction-related emissions of ROG, CO, PM_{10}, and $PM_{2.5}$ would not exceed the screening level thresholds and would not violate air quality standards or contribute substantially to an existing or projected air quality violation. However, construction-generated NO_X emissions would exceed applicable mass emission thresholds, regardless of the material disposal scenario. **Therefore, construction of the Freshwater Alternative could violate an ambient air quality standard or contribute substantially to an existing violation and impacts would be significant (Criterion B).**

The cumulative analysis focuses on whether a specific project would result in cumulatively considerable increase in emissions. By its very nature, air pollution is largely a cumulative impact. The nonattainment status of regional pollutants is a result of past and present development within the air basin and this regional impact is cumulative rather than attributable to any one source. A project's emissions may be individually limited but cumulatively considerable when taken in combination with past, present, and future development projects.

The thresholds of significance are relevant to whether a project's individual emissions would result in a cumulatively considerable incremental contribution to the existing cumulative air quality conditions. These thresholds are designed to identify those projects that would result in significant levels of air pollution and to assist the region in attaining the applicable state and federal ambient air quality standards. Projects that would not exceed the thresholds of significance would not contribute a considerable amount of criteria air pollutant emissions to the region's emissions profile, and would not impede attainment and maintenance of ambient air quality standards. **Because construction of the Enhancement Project would exceed the project-level air quality significance thresholds, the Freshwater Alternative would have a cumulatively considerable contribution to the region's air quality (Criterion C).**

The greatest potential for TAC emissions resulting from construction of the Enhancement Project would originate from diesel PM emissions associated with heavy equipment operations during construction activities. Typically, construction projects generate diesel PM in a single area for a short period of time. Project construction would also result in the generation of diesel PM emissions from the use of off-road diesel construction equipment required for vegetation clearing, dredging, material disposal, and construction of infrastructure. Other construction-related sources of diesel PM are material delivery trucks and may include construction worker vehicles. Emissions associated with vehicle trips to and from the project site during construction would be dispersed throughout the region and would have a nominal localized impact at the project site. Therefore, the analysis of potential impacts focuses on localized diesel PM emissions generated by on-site construction activities.

Sensitive receptors are located at varying distances from the project site. To the north and south of the Weir, Railroad, and Coast Highway Basins, the surrounding land uses are primarily single- and multi-family residential land uses. These properties are located adjacent to the project site and staging areas. The land uses bordering the I-5 Basin are primarily commercial buildings and are located approximately 400 feet to the north and 200 feet east of the project site.

The dose of TACs to which receptors are exposed is the primary factor used to determine health risk. Dose is a function of the concentration of a substance or substances in the environment and the extent of exposure a person has with the substance. Dose is positively correlated with time, meaning that a longer exposure period to a fixed amount of emissions results in a higher exposure level and higher health risks.

According to the Office of Environmental Health Hazard Assessment's health risk assessments program (OEHHA 2003), which is used to determine the exposure of sensitive receptors to TAC emissions, risk should be based on a 70-year exposure period. The period of construction for the Enhancement Project is approximately 2 years. Thus, if the maximum duration of potentially harmful construction activities near a sensitive receptor is 2 years, then the exposure would be approximately 3 percent of the total exposure period used for typical health risk calculations (i.e., 70 years).

The distance at which off-road and dredging equipment would operate near sensitive receptors would vary considerably during that time. For example, activities that would occur in the overdredge pit (Coast Highway Basin) would occur more than 500 feet from the nearest sensitive receptor. Construction equipment would operate at a distance reasonably considered to have an effect on sensitive receptors (i.e., within 500 feet) for less time than the total period of the construction schedule.

However, the staging area in the Railroad Basin would be located adjacent to residential receptors. Activities would occur at that staging area for the duration of the construction schedule. At the time of this analysis, it is unknown to what extent off-road equipment and on-road vehicles would operate in that area. Therefore, the analysis conservatively assumes that unhealthful pollutant concentrations could be generated at the staging area. **The Freshwater Alternative could expose sensitive receptors to substantial construction pollutant concentrations, and this impact would be significant (Criterion D).**

CO concentration is a direct function of motor vehicle activity, particularly during peak commute hours, and certain meteorological conditions. Under specific meteorological conditions, CO concentrations may reach unhealthy levels with respect to local sensitive land uses, such as residential areas, schools, preschools, playgrounds, and hospitals. As a result, air districts typically recommend analysis of CO emissions at a local rather than a regional level. Many air districts have established preliminary screening criteria to determine if mobile-source emissions of CO would result in, or substantially contribute to, emissions concentrations that exceed the 1-hour ambient air quality standard of 20 parts per million (ppm) or the 8-hour standard of 9.0 ppm, respectively.

The traffic analysis determined that there were no cases where the project would add 50 or more vehicles to the roadway network in either direction of traffic during the peak hour (VRPA 2014; Appendix H). Therefore, a more detailed traffic analysis was not considered necessary, and the Enhancement Project would not have significant traffic impacts. Since the project would not have a significant traffic impact, it was also not anticipated that implementation of the project would cause a CO hotspot. **The Freshwater Alternative would not violate the CAAQS for the 1-hour period (20 ppm) or the 8-hour period (9.0 ppm), and this impact would be less than significant (Criterion D).**

Potential sources that may emit odors during construction activities include exhaust from diesel construction equipment. However, because of the temporary nature of these emissions and the highly diffusive properties of diesel exhaust, nearby receptors would not be affected by diesel exhaust odors associated with project construction. Odors from these sources would be localized and generally confined to the immediate area surrounding the proposed project site.

The Enhancement Project would utilize typical construction techniques, and the odors from off-road equipment and on-road vehicles would be typical of most construction sites and temporary in nature. Construction activities would include removal of vegetation (primarily cattails) and drying for off-site transport and disposal, dredging and grading within the lagoon, and disposal of sediments excavated from the lagoon to different locations. Pipelines would be used for disposal of dredged material and would not increase odors in the area during that process. However, the water levels control odor from the underlying sediment, and dredging and grading activities could temporarily disturb soils and affect water levels at locations throughout the lagoon. Sediment in the lagoon would not contain odor-generating contaminants other than naturally occurring organic material. Dredging and grading activities would not be concentrated in any one location for extended periods of time, and odors released from the underlying sediment would move from one area to another as the project progresses. While an odor may be noted, it would be typical of odor currently associated with conditions in the area, as discussed in Section 3.11.1. During drying activities, various odors may be emitted from the vegetation piles due to decomposition of organic materials in the project area. However, vegetation drying areas would be located at the northeastern portion of the project site and would not be adjacent to residential land uses or sensitive receptors. The nearest sensitive receptors are located more than 1,000 feet to the north and southwest of the proposed vegetation drying areas. **Therefore, the**

Freshwater Alternative would not create objectionable odors affecting a substantial number of people, and this impact would be less than significant (Criterion E).

Permanent Impacts

The Freshwater Alternative is not anticipated to generate new vehicle trips and would not generate additional activities related to maintenance or operations that would exceed existing levels. **The Freshwater Alternative would not conflict with or obstruct implementation of the applicable air quality plan, and this impact would be less than significant (Criterion A).**

Since maintenance activities associated with the Freshwater Alternative would require only minimal use of off-road equipment and would generate few new vehicle trips, operations emissions would be negligible and thus were not estimated for the Freshwater Alternative. **Therefore, the Freshwater Alternative would not violate an ambient air quality standard or contribute substantially to an existing violation, and this impact would be less than significant (Criterion B).**

Because maintenance and operations emissions would not exceed the project-level air quality significance thresholds, **the Freshwater Alternative would not have a cumulatively considerable contribution to the region's air quality (Criterion C).**

Operations activities for the Freshwater Alternative would not generate substantial TAC emissions. **Therefore, the Freshwater Alternative would not expose sensitive receptors to substantial operations TAC concentrations, and the impact would be less than significant (Criterion D).**

Excessive concentrations of nutrients such as nitrogen and phosphorus can lead to algal blooms that in turn promote eutrophication and hypoxia (depressed DO) that can cause unpleasant odors. The 1994 Water Quality Control Plan includes water quality objectives that the waters of Buena Vista Lagoon shall not contain taste- or odor-producing substances at concentrations that cause a nuisance or adversely affect beneficial uses.

The Freshwater Alternative would provide a slight water quality improvement throughout the lagoon by increasing circulation and hydraulic efficiency by removing vegetation and sediment in open water areas to improve inter-basin flow exchange. The Freshwater Alternative involves removing vegetation and excess sediment and constructing a new weir that would improve hydraulics and flood performance compared to existing conditions. Improved water quality and increased circulation could also reduce development of foul odors associated with anaerobic conditions. Algal blooms and eutrophication could occur throughout the lagoon in the future.

However, long-term odors associated with the Freshwater Alternative would be anticipated to be similar to existing conditions. **Therefore, the Freshwater Alternative would not create objectionable odors affecting a substantial number of people, and impacts would be less than significant (Criterion E).**

Saltwater Alternative

Temporary Impacts

Similar to the Freshwater Alternative, the Saltwater Alternative would primarily involve dredging and off-road equipment operations. On-road trip generation would also occur during construction of the Enhancement Project. Since the trip generation associated with construction would be temporary, the Enhancement Project would not increase activities and/or emissions associated with on-road mobile sources that have been included in the RAQS. **The Saltwater Alternative would not obstruct or conflict with the implementation of the SDAPCD RAQS, and this impact would be less than significant (Criterion A).**

Construction of the Saltwater Alternative would include vegetation removal, dredging and grading within the lagoon, disposal of sediments excavated from the lagoon, infrastructure improvements (e.g., replacement of the Carlsbad Boulevard bridge, Boardwalk construction), and revegetation of graded areas. During construction, criteria air pollutant and precursor emissions would be temporarily and intermittently generated from a variety of sources. Construction would include off-road equipment, such as backhoes and front-end loaders, boats, hydraulic dredge equipment, and heavy-duty trucks. In addition, booster pumps would be necessary to convey material to the disposal locations.

As shown in Table 3.11-6, construction emissions for disposal at LA-5 would result in maximum daily emissions of approximately 75 pounds of ROG, 646 pounds of NO_X, 322 pounds of CO, 41 pounds of PM_{10}, and 31 pounds of $PM_{2.5}$. Additional modeling assumptions and details are provided in Appendix I. Construction emissions for the overdredge pit would result in maximum daily emissions of approximately 57 pounds of ROG, 503 pounds of NO_X, 244 pounds of CO, 36 pounds of PM_{10}, and 26 pounds of $PM_{2.5}$. Additional modeling assumptions and details are provided in Appendix I.

As shown in Table 3.11-6, construction-related emissions of ROG, CO, PM_{10}, and $PM_{2.5}$ would not exceed the County's screening level thresholds and would not violate air quality standards or contribute substantially to an existing or projected air quality violation. However, construction-generated NO_X emissions would exceed applicable mass emission thresholds, regardless of the material disposal scenario. **Therefore, construction of the Saltwater Alternative could violate**

an ambient air quality standard or contribute substantially to an existing violation, and impacts would be significant (Criterion B).

Table 3.11-6
Estimated Daily Construction Emissions – Saltwater

Emission Source	Criteria Pollutant Emissions (pounds/day)				
	ROG	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**
LA-5					
Mobilization	0.72	8.07	3.69	0.33	0.26
Site Preparation	3.95	28.50	15.72	1.04	0.93
Vegetation Clearing	9.54	156.80	44.12	5.08	3.73
Sediment Removal	64.43	553.39	276.08	37.05	27.42
Construct Stabilized Inlet Channel	4.11	29.06	19.20	1.50	1.38
Infrastructure Improvements	10.26	92.00	45.44	3.85	3.27
Worker Commutes	0.03	0.31	0.72	0.05	0.03
Maximum Daily Emissions	**74.72**	**645.69**	**322.23**	**40.96**	**30.72**
Daily Thresholds	**75**	**250**	**550**	**100**	**55**
Exceed Thresholds?	**No**	**Yes**	**No**	**No**	**No**
Overdredge Pit					
Mobilization	0.72	8.07	3.69	0.33	0.26
Site Preparation	3.96	28.63	16.02	1.06	0.95
Vegetation Clearing	9.55	156.93	44.42	5.10	3.74
Sediment Removal	46.84	410.96	198.48	32.24	22.99
Construct Stabilized Inlet Channel	4.12	29.19	19.50	1.53	1.40
Infrastructure Improvements	10.26	92.00	45.44	3.85	3.27
Worker Commutes	0.01	0.13	0.30	0.02	0.01
Maximum Daily Emissions	**57.11**	**503.08**	**244.21**	**36.12**	**26.28**
Daily Thresholds	**75**	**250**	**550**	**100**	**55**
Exceed Thresholds?	**No**	**Yes**	**No**	**No**	**No**

Source: Modeled by AECOM 2014; for more detail see Appendix I

As discussed under the Freshwater Alternative, the thresholds of significance are relevant to whether a project's individual emissions would result in a cumulatively considerable incremental contribution to the existing cumulative air quality conditions. Projects that would not exceed the thresholds of significance would not contribute a considerable amount of criteria air pollutant emissions to the region's emissions profile, and would not impede attainment and maintenance of ambient air quality standards. **Because construction of the Enhancement Project would exceed the project-level air quality significance thresholds, the Saltwater Alternative would have a cumulatively considerable contribution to the region's air quality (Criterion C).**

Similar to the Freshwater Alternative, the greatest potential for TAC emissions resulting from construction of the Enhancement Project would originate from diesel PM emissions associated with heavy equipment operations during construction activities. Sensitive receptors are primarily residences located at varying distances north and south of the Weir, Railroad, and Coast Highway Basins. The period of construction for the Enhancement Project is approximately 2 years. Thus, if the maximum duration of potentially harmful construction activities near a sensitive receptor is 2 years, then the exposure would be approximately 3 percent of the total exposure period used for typical health risk calculations (i.e., 70 years).

Similar to the Freshwater Alternative, the distance at which off-road and dredging equipment would operate near sensitive receptors would vary considerably during that time. The staging area in the Railroad Basin would be located adjacent to residential receptors. At the time of this analysis, it is unknown to what extent off-road equipment and on-road vehicles would operate in that area. Therefore, the analysis conservatively assumes that unhealthful pollutant concentrations could be generated at the staging area. **The Saltwater Alternative could expose sensitive receptors to substantial construction pollutant concentrations, and this impact would be significant (Criterion D).**

The traffic analysis determined that there were no cases where the Saltwater Alternative would add 50 or more vehicles to the roadway network in either direction of traffic during the peak hour (VRPA 2014; Appendix H). Therefore, a more detailed traffic analysis was not considered necessary, and the Enhancement Project would not have significant traffic impacts. Since the project would not have a significant traffic impact, it was also not anticipated that implementation of the project would cause a CO hotspot. **The Saltwater Alternative would not violate the CAAQS for the 1-hour period (20 ppm) or the 8-hour period (9.0 ppm), and this impact would be less than significant (Criterion D).**

Similar to the Freshwater Alternative, the Saltwater Alternative would utilize typical construction techniques, and the odors from off-road equipment and on-road motor vehicles would be typical of most construction sites and temporary in nature. Dredging and grading activities would not be concentrated in any one location for extended periods of time, and odors released from the underlying sediment would move from one area to another as the project progresses. While an odor may be noted, it would be typical of odor currently associated with conditions in the area, as discussed in Section 3.11.1. During drying activities, various odors may be emitted from the vegetation piles due to decomposition of organic materials in the project area. However, vegetation drying areas would be located at the northeastern portion of the project site and would not be located within 1,000 feet of residential land uses or sensitive receptors. **Therefore, the Saltwater Alternative would not create objectionable odors affecting a substantial number of people, and this impact would be less than significant (Criterion E).**

<u>Permanent Impacts</u>

As discussed earlier, project consistency is based on whether the Enhancement Project would conflict with or obstruct implementation of the RAQS and/or applicable portions of the SIP.

Monitoring and maintenance activities would occur annually, or as needed, and would require minor on-road trips associated with workers or mobilization of equipment. The Enhancement Project would not require substantial daily on-road vehicle trips for continued project operations because it would not involve facilities requiring intensive maintenance. Therefore, the Enhancement Project would not substantially increase activities and/or emissions associated with on-road mobile sources that have been included in the RAQS. Accordingly, implementation of the Enhancement Project would not exceed the assumptions used to develop the current RAQS and would not obstruct or conflict with SDAPCD's RAQS. **The Saltwater Alternative would not obstruct or conflict with the SDAPCD RAQS, and this impact would be less than significant (Criterion A).**

Maintenance requirements would be determined during the long-term monitoring program and may include vegetation removal and inlet maintenance. The most intensive maintenance activities would involve inlet maintenance, which would occur approximately every 12 to 20 months. The estimates of operations emissions are based on similar assumptions to those for construction emissions, as the primary sources of emissions would be similar to those used in the construction phase, including off-road equipment, and on-road motor vehicle trips. Table 3.11-7 shows the projected emissions associated with operations and maintenance activities.

Table 3.11-7
Estimated Daily Operations and Maintenance Emissions – Saltwater

Emission Source	Criteria Pollutant Emissions (pounds/day)				
	ROG	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**
Maximum Daily Emissions	10.12	78.92	38.86	21.20	12.80
Daily Thresholds	75	250	550	100	55
Exceed Thresholds?	No	No	No	No	No

Source: Modeled by AECOM 2014; for more detail see Appendix I

As shown in Table 3.11-7, operations emissions of ROG, NOx, CO, PM_{10}, and $PM_{2.5}$ would not exceed the County's screening level thresholds. **Therefore, operation of the Saltwater Alternative would not violate an ambient air quality standard or contribute substantially to an existing violation, and this impact would be less than significant (Criterion B).**

Because maintenance and operations emissions would not exceed the project-level air quality significance thresholds, **the Saltwater Alternative would not have a cumulatively considerable contribution to the region's air quality (Criterion C).**

Operation and maintenance activities for the Enhancement Project would result in short-term diesel exhaust emissions from on-site heavy-duty equipment. The use of off-road heavy-duty diesel equipment would be temporary (approximately 1 to 2 weeks per year) and equipment would operate at varying distances from sensitive receptors, such that exposure to higher concentrations of TAC emissions would be sporadic and short-term. **Therefore, maintenance-related TAC emissions associated with the Saltwater Alternative would not expose sensitive receptors to substantial emissions of TACs, and this impact would be less than significant (Criterion D).**

Operations emissions associated with maintenance activities would include odors from exhaust from diesel equipment similar to construction activities. Infrequent maintenance worker trips would not be anticipated to generate or expose persons to substantial odor emissions. The Saltwater Alternative would provide long-term water quality improvement throughout the lagoon by permanently increasing the hydraulic efficiency of Buena Vista Lagoon over existing conditions by constructing a tidal inlet, improving infrastructure (Carlsbad Boulevard bridge), and creating and expanding channels to create better flow throughout the basins. Improved water quality and increased circulation could also reduce development of foul odors associated with anaerobic conditions. Algal blooms and eutrophication would vary in the future and throughout the lagoon. However, long-term odors associated with the Saltwater Alternative would be anticipated to be similar to existing conditions. **Therefore, the Saltwater Alternative would not create objectionable odors affecting a substantial number of people, and impacts would be less than significant (Criterion E).**

Hybrid Alternative

<u>Temporary Impacts</u>

Similar to the Freshwater and Saltwater Alternatives, the Hybrid Alternative (Options A and B) would primarily involve dredging and off-road equipment operations. On-road trip generation would also occur during construction of the Enhancement Project. Since the trip generation associated with construction would be temporary, the Enhancement Project would not increase activities and/or emissions associated with on-road mobile sources that have been included in the RAQS. **The Hybrid Alternative would not obstruct or conflict with the implementation of the SDAPCD RAQS, and this impact would be less than significant (Criterion A).**

As shown in Table 3.11-8, construction emissions for disposal at LA-5 would result in maximum daily emissions of approximately 75 pounds of ROG, 646 pounds of NO_X, 322 pounds of CO, 41 pounds of PM_{10}, and 31 pounds of $PM_{2.5}$. Additional modeling assumptions and details are provided in Appendix I. Construction emissions for the overdredge pit would result in maximum daily emissions of approximately 57 pounds of ROG, 503 pounds of NO_X, 244 pounds of CO, 36 pounds of PM_{10}, and 26 pounds of $PM_{2.5}$. Additional modeling assumptions and details are provided in Appendix I.

Table 3.11-8
Estimated Daily Construction Emissions – Hybrid

Emission Source	Criteria Pollutant Emissions (pounds/day)				
	ROG	NO_X	CO	PM_{10}	$PM_{2.5}$
LA-5					
Mobilization	0.72	8.07	3.69	0.33	0.26
Site Preparation	3.95	28.50	15.72	1.04	0.93
Vegetation Clearing	9.54	157.01	44.15	5.08	3.74
Sediment Removal	64.43	553.39	276.08	37.05	27.42
Construct Stabilized Inlet/Channel Guide	19.11	167.76	84.43	7.07	6.17
Infrastructure Improvements	10.26	92.00	45.44	3.85	3.27
Worker Commutes	0.03	0.31	0.72	0.05	0.03
Maximum Daily Emissions	**74.72**	**645.69**	**322.23**	**40.96**	**30.72**
Daily Thresholds	**75**	**250**	**550**	**100**	**55**
Exceed Thresholds?	**No**	**Yes**	**No**	**No**	**No**
Overdredge Pit					
Mobilization	0.72	8.07	3.69	0.33	0.26
Site Preparation	3.95	28.50	15.72	1.04	0.93
Vegetation Clearing	9.54	157.01	44.15	5.08	3.74
Sediment Removal	46.67	410.82	197.90	32.20	22.96
Construct Stabilized Inlet/Channel Guide	19.11	167.76	84.43	7.07	6.17
Infrastructure Improvements	10.26	92.00	45.44	3.85	3.27
Worker Commutes	0.01	0.13	0.30	0.02	0.01
Maximum Daily Emissions	**56.94**	**502.95**	**243.64**	**36.07**	**26.24**
Daily Thresholds	**75**	**250**	**550**	**100**	**55**
Exceed Thresholds?	**No**	**Yes**	**No**	**No**	**No**

Source: Modeled by AECOM 2014; for more detail see Appendix I

As shown in Table 3.11-8, construction-related emissions of ROG, CO, PM_{10}, and $PM_{2.5}$ would not exceed the screening level thresholds and would not violate air quality standards or contribute substantially to an existing or projected air quality violation. However, construction-generated NO_X emissions would exceed applicable mass emission thresholds, regardless of the materials disposal scenario. **Therefore, construction of the Hybrid Alternative could violate an ambient air quality standard or contribute substantially to an existing violation, and impacts would be significant (Criterion B).**

As discussed under the Freshwater and Saltwater Alternatives, projects that would not exceed the thresholds of significance would not contribute a considerable amount of criteria air pollutant emissions to the region's emissions profile, and would not impede attainment and maintenance of ambient air quality standards. **Because construction of the Enhancement Project would exceed the project-level air quality significance thresholds, the Hybrid Alternative would have a cumulatively considerable contribution to the region's air quality (Criterion C).**

Similar to the Freshwater and Saltwater Alternatives, the greatest potential for TAC emissions resulting from construction of the Enhancement Project would originate from diesel PM emissions associated with heavy equipment operations during construction activities. The period of construction for the Enhancement Project is approximately 2 years. Thus, if the maximum duration of potentially harmful construction activities near a sensitive receptor is 2 years, then the exposure would be approximately 3 percent of the total exposure period used for typical health risk calculations (i.e., 70 years).

Similar to the Freshwater and Saltwater Alternatives, the distance at which off-road and dredging equipment would operate near sensitive receptors would vary considerably during that time. However, the staging area in the Railroad Basin would be located adjacent to residential receptors. Activities would occur at that staging area for the duration of the construction schedule. At the time of this analysis, it is unknown to what extent off-road equipment and on-road vehicles would operate in that area. Therefore, the analysis conservatively assumes that unhealthful pollutant concentrations could be generated at the staging area. **The Hybrid Alternative could expose sensitive receptors to substantial construction pollutant concentrations, and this impact would be significant (Criterion D).**

Since the project would not have a significant traffic impact, it was also not anticipated that implementation of the project would cause a CO hotspot. **The Hybrid Alternative would not violate the CAAQS for the 1-hour period (20 ppm) or the 8-hour period (9.0 ppm), and this impact would be less than significant (Criterion D).**

Similar to the Freshwater and Saltwater Alternatives, the Hybrid Alternative would utilize typical construction techniques, and the odors from off-road equipment and on-road motor vehicles would be typical of most construction sites and temporary in nature. Dredging and grading activities would not be concentrated in any one location for extended periods of time, and odors released from the underlying sediment would move from one area to another as the project progresses. While an odor may be noted, it would be typical of odor currently associated with conditions in the area, as discussed in Section 3.11.1. However, vegetation drying areas would be located at the northeastern portion of the project site, and would not be located within 1,000 feet of residential land uses or sensitive receptors. **Therefore, the Hybrid Alternative would not create objectionable odors affecting a substantial number of people, and this impact would be less than significant (Criterion E).**

Permanent Impacts

As discussed earlier, project consistency is based on whether the Enhancement Project would conflict with or obstruct implementation of the RAQS and/or applicable portions of the SIP. Monitoring and maintenance activities would occur annually, or as needed, and would require minor on-road trips associated with workers or mobilization of equipment. The Enhancement Project would not require substantial daily on-road vehicle trips for continued project operations because it is an enhancement project that would not involve facilities requiring intensive maintenance. Therefore, the Enhancement Project would not substantially increase activities and/or emissions associated with on-road mobile sources that have been included in the RAQS. Accordingly, implementation of the Enhancement Project would not exceed the assumptions used to develop the current RAQS and would not obstruct or conflict with SDAPCD's RAQS. **The Hybrid Alternative would not obstruct or conflict with the implementation of the SDAPCD RAQS, and this impact would be less than significant (Criterion A).**

Maintenance requirements would be determined during the long-term monitoring program and may include vegetation removal and inlet maintenance. The most intensive maintenance activities would involve inlet maintenance and would occur approximately every 12 to 20 months. The estimates of operations emissions are based on similar assumptions to those for construction emissions, as the primary sources of emissions would be similar to those used in the construction phase, including off-road equipment, and on-road motor vehicle trips. Table 3.11-9 shows the projected emissions associated with operations and maintenance activities.

Table 3.11-9
Estimated Daily Operations and Maintenance Emissions – Hybrid Alternative

Emission Source	Criteria Pollutant Emissions (pounds/day)				
	ROG	NO_X	CO	PM_{10}	$PM_{2.5}$
Maximum Daily Emissions	10.12	78.92	38.86	21.20	12.80
Daily Thresholds	75	250	550	100	55
Exceed Thresholds?	No	No	No	No	No

Source: Modeled by AECOM 2014

As shown in Table 3.11-9, operations emissions of ROG, NOx, CO, PM_{10}, and $PM_{2.5}$ would not exceed the County's screening level thresholds. **Therefore, operation of the Hybrid Alternative would not violate an ambient air quality standard or contribute substantially to an existing violation, and this impact would be less than significant (Criterion B).**

Because maintenance and operations emissions would not exceed the project-level air quality significance thresholds, **the Hybrid Alternative would not have a cumulatively considerable contribution to the region's air quality (Criterion C).**

Operation and maintenance activities for the Enhancement Project would result in short-term diesel exhaust emissions from on-site heavy-duty equipment. The use of off-road heavy-duty diesel equipment would be temporary (approximately 1 to 2 weeks per year) and equipment would operate at varying distances from sensitive receptors. **Therefore, maintenance-related TAC emissions associated with the Hybrid Alternative would not expose sensitive receptors to substantial emissions of TACs, and this impact would be less than significant (Criterion D).**

Operations emissions associated with maintenance activities would include odors from exhaust from diesel equipment similar to construction activities. Infrequent maintenance worker trips would not be anticipated to generate or expose persons to substantial odor emissions. The Hybrid Alternative would provide a long-term water quality improvement throughout the lagoon by permanently providing tidal exchange and increasing circulation. Improved water quality and increased circulation could also reduce development of foul odors associated with anaerobic conditions. Algal blooms and eutrophication could occur throughout the lagoon in the future. However, long-term odors associated with the Hybrid Alternative would be anticipated to be similar to existing conditions. **Therefore, the Hybrid Alternative would not create objectionable odors affecting a substantial number of people, and impacts would be less than significant (Criterion E).**

No Project Alternative

Under the No Project Alternative, the proposed enhancement of the lagoon would not be completed at the project site. No removal of sediment or vegetation would occur, and no maintenance would be implemented to enhance the biological and hydrological functions of the lagoon. Additionally, improvements such as the Boardwalk and Carlsbad Boulevard bridge would not be constructed. No materials would be dredged or excavated that would need to be disposed of or used for littoral cell nourishment under the No Project Alternative. As a result**,** there would be no increase in activities under the No Project Alternative, and emissions would not increase. Therefore, **no impacts would occur related to emissions and air quality from the No Project Alternative (Criteria A through E).**

3.11.4 MITIGATION MEASURES

Construction-related emissions would exceed the recommended NOx levels of significance for all project alternatives, and construction activities could lead to a violation of an applicable air quality standard. Implementation of mitigation measures would address potential violations of air quality standards as a result of construction-related activities. Mitigation measures are also recommended to ensure that fugitive dust emissions do not exceed the applicable thresholds of significance and to minimize impacts to sensitive receptors. To reduce construction-related criteria pollutant emissions, the Enhancement Project will implement the following mitigation measures for the duration of the construction period:

Air Quality-1 Off-road construction diesel engines not registered under ARB's Statewide Portable Equipment Registration Program that have a rating of 50 horsepower (hp) or more, shall meet, at a minimum, the Tier 4 California Emissions Standards, unless such an engine is not available for a particular item of equipment. Other Tier engines (e.g., Tier 3) will be allowed on a case-by-case basis when the contractor has documented that no Tier 4 equipment or emissions equivalent retrofit equipment is available for a particular equipment type that must be used to complete construction. Documentation shall consist of signed written statements from at least two construction equipment rental firms.

Air Quality-2 The following measures shall be implemented by the construction contractor and enforced by an on-site monitor to meet SDAPCD Rule 55 requirements to control fugitive dust emissions:

- Exposed surfaces (e.g., unpaved access roads) shall be watered, as necessary, to control fugitive dust.
- Sweepers and water trucks shall be used to control dust and debris at public street access points.
- Dirt storage piles shall be stabilized by chemical binders, tarps, fencing, or other suppression measures.
- Provide perimeter erosion control to prevent washout of silty material onto public roads.
- Cover haul trucks or maintain at least 12 inches of freeboard to reduce blow-off during hauling.
- Enforce a 15-mph speed limit on unpaved surfaces.

Air Quality-3 Minimize idling time by shutting equipment off when not in use or reducing the time of idling to no more than 3 minutes (5-minute limit is required by the state airborne toxics control measure [Title 13, sections 2449(d)(3) and 2485 of the California Code of Regulations]). Provide clear signage that posts this requirement for workers at the entrances to the site.

Air Quality-4 Maintain construction equipment in proper working condition according to manufacturer's specifications. The equipment must be checked by a certified mechanic and determined to be running in proper condition before it is operated.

Mitigation Measure Air Quality-1 requires engines in diesel-fueled construction equipment above 50 hp to meet Tier 4 emission standards. Interim Tier 4 and Tier 4 emission standards are effective between 2008 and 2015, with the effective date dependent on engine horsepower.

The OFFROAD model used in the analysis contains ranges of tier engines and uses average fleet data (Tier 0 to Tier 4) to develop emission factors for a given calendar year. Based on the improvements in emissions standards required by ARB, the analysis assumes that using off-road construction equipment with Tier 4 engines would result in an additional 46 to 94 percent reduction in NO_X emissions from the use of Tier 2 equipment, depending on the horsepower of the equipment. Off-road engines from 75 to 750 hp would be required to meet an emission standard of 0.3 grams/brakehorsepower-hour (g/bhp-hr), or an average reduction of 87 percent from the emission factors used for the analysis. Therefore, the 87 percent reduction was applied to emissions from off-road equipment for all project alternatives.

The estimated reductions in daily criteria pollutant emissions achieved by Mitigation Measure Air Quality-1 were estimated by multiplying unmitigated peak daily emissions by the percentages discussed above. Table 3.11-10 shows the mitigated construction emissions for the Enhancement Project.

Table 3.11-10
Mitigated Daily Construction Emissions

	NO_X Emissions (pounds/day)
Freshwater Alternative	
LA-5	**383.75**
Overdredge Pit	241.01
Saltwater Alternative	
LA-5	**413.68**
Overdredge Pit	**271.07**
Hybrid Alternative	
LA-5	**413.68**
Overdredge Pit	**270.94**
Daily Thresholds	250

Source: Modeled by AECOM 2014; for more detail see Appendix I
Note: Bold results indicate emissions that exceed the threshold of significance.

As shown in Table 3.11-10, implementation of Mitigation Measure Air Quality-1 would reduce emissions associated with the construction of the Freshwater Alternative (overdredge pit), and this impact would be less than significant (Criteria B and C). However, the mitigated NOx emissions for the Enhancement Project would continue to exceed the applicable significance thresholds for the Freshwater Alternative (LA-5 disposal scenario), Saltwater Alternative, and Hybrid Alternative. Even with implementation of Mitigation Measure Air Quality-1 discussed above, construction-related NO_X emissions for the Freshwater Alternative (LA-5 disposal scenario), Saltwater Alternative, and Hybrid Alternative would continue to exceed the threshold of significance, and this impact would remain significant and unavoidable (Criteria B and C).

Mitigation measures Air Quality-1 through Air Quality-3 would also reduce localized NO_X and PM emissions at the project site. Because residential land uses would be located adjacent to the staging areas and off-road equipment and on-road vehicles would operate in that area for the entire construction period, the Enhancement Project could expose sensitive receptors to substantial construction pollutant concentrations. No additional feasible mitigation is available to reduce this impact. Therefore, impacts associated with construction of the Enhancement Project would remain significant and unavoidable (Criterion D).

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